Tularemia

Bioterrorism Agent Profiles for Health Care Workers

Causative Agent: Tularemia is a zoonotic disease caused by the gram-negative coccobacillus *Francisella tularensis*.

Routes of Exposure: Tularemia can be acquired by humans by inoculation of the skin or mucous membranes with blood or tissue from infected animals, or bites of infected deerflies, mosquitoes, or ticks. Less commonly, inhalation of contaminated dust or ingestion of contaminated foods or water can also cause human disease. The animal reservoirs of disease include rabbits, muskrats, and squirrels.

Infective Dose & Infectivity: 10-50 organisms

Incubation Period: The incubation period ranges from 1 to 14 days with an average of 3 to 5 days.

Clinical Effects: Different clinical forms of disease are seen depending on the route of exposure. Disease resulting from intentional aerosol release of *F. tularensis* would primarily cause typhoidal tularemia. Gastrointestinal symptoms such as diarrhea and pain may also be present. Typhoidal tularemia manifests with fever, prostration, weight loss, but with no adenopathy. Pneumonia is most common with the typhoidal form. Tularemia pneumonia is generally a severe atypical pneumonia that may be fulminating and can result from either inhalation of infectious aerosols or from aspiration of organisms from the pharynx. Tularemia pneumonia can also be secondary to a tularemia bacteremia. Tularemia pneumonia generally manifests with fever, headache, substernal discomfort, and non-productive cough. Radiographic evidence of pneumonia or mediastinal lymphadenopathy may or may not be present. Oculoglandular tularemia can result from inoculation of the conjunctivae with hand or fingers contaminated by tissue and/or fluids from an infected animal. The gastrointestinal form of tularemia manifests as abdominal pain, nausea, vomiting and diarrhea.

Laboratory testing: Identification of organisms by staining ulcer fluids or sputum is generally not helpful. Routine culture is difficult due to unusual growth requirements and/or overgrowth of commensal bacteria. Culturing is difficult and potentially dangerous. If tularemia is suspected, the laboratory should be notified because of the high risk to laboratory workers due to transmissibility of the bacteria. The following medical sample collections are recommended:
0-24 hours: nasal swabs, sputum, and induced respiratory secretions for culture, FA and PCR
24-72 hours: blood for culture, sputum for FA and PCR
>6 days: serum for IgM and later IgG, agglutination, pathology samples

Lethality: The mortality rate without treatment is 33%. However, with appropriate treatment, the mortality rate is less than 2%.

Transmissibility: There is no known person-to-person transmission.

Primary contaminations & Methods of Dissemination: Tularemia would most likely be delivered via aerosolization, or sabotage of food and/or water.

Secondary Contamination & Persistence of organism: Secondary transmission is not an issue. However, *F. tularensis* can persist in cold, moist environments for extended periods.

Decontamination & Isolation:

Patients- Precautions should be practiced, additionally, contact precautions should be used with lesions and secretions. Patients with direct exposure to aerosols, as well as their clothing, should be washed with soap and water.

Equipment, clothing & other objects- Heat, 5% hypochlorite and 10% bleach will readily kill the organisms and can be used for environmental decontamination.

Outbreak control: Following an intentional release, the risk of acquiring infection from local animals is minimal. The risk can be further minimized by educating the public in avoidance of sick animals as well as personal protective measures against bites from mosquitoes, deerflies, or ticks. Standard levels of chlorine in municipal water sources should protect against waterborne infection. In warm, arid environments, organisms in the soil are unlikely to survive for significant periods of time and are unlikely to present a hazard.

Treatment: The recommended treatment for tularemia in a contained casualty setting is gentamycin, 5MG/KG/day IV or IM for 10 to 14 days. In a mass casualty setting where patients cannot be managed individually, the recommended treatments are doxycycline, 100 mg orally twice daily for 14 days, or ciprofloxacin*, 500 mg orally twice daily for 14 days.

Prophylaxis: Exposed individuals can be treated prophylactically with doxycycline, 100 mg orally twice daily for 14days, or ciprofloxacin, 500 mg orally twice daily for 14 days.

Differential Diagnosis: The differential diagnoses should include typhoidal syndromes: Salmonella, Rickettsia, malaria, and any atypical pneumonic process.

References:

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* Not an FDA approved indication